

For Reference

NOT TO BE TAKEN FROM THIS ROOM

Ex LIBRIS
UNIVERSITATIS
ALBERTAENSIS





Digitized by the Internet Archive
in 2020 with funding from
University of Alberta Libraries

<https://archive.org/details/Chachra1970>

THE UNIVERSITY OF ALBERTA

FISCAL AND MONETARY INFLUENCE
ON STOCK PRICES

by



Fakir C. Chachra

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

FACULTY OF BUSINESS ADMINISTRATION AND COMMERCE

EDMONTON, ALBERTA

FALL, 1970

1970 F
36

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read,
and recommend to the Faculty of Graduate Studies for
acceptance, a thesis entitled Fiscal and Monetary
Influence on Stock Prices, submitted by Fakir C. Chachra
in partial fulfilment of the requirements for the
degree of Master of Business Administration.

ABSTRACT

The study seeks to find empirical evidence regarding monetary and fiscal influence on stock prices in Canada and the U.S. It is conducted on a long term basis. Principal monetary measures used in the study are the total supply of money and interest rates; principal fiscal measures are total public spending and tax rate.

The main objectives of the thesis are (1) to determine the influence of money supply, public spending, interest rate and the rate on the levels of stock prices, and (2) to note whether the influence of these variables on stock prices are similar in Canada and the U.S. In order to achieve these objectives, data on these variables were obtained for Canada as well as the U.S. The data were then subjected to simple and multiple regressions.

The results of the study show that for both Canada and the U.S., money supply and public spending are the main factors influencing stock prices. However, due to the problem of multicollinearity, the study remains inconclusive in determining the importance of these variables individually. Interest rate and tax rate do not seem to have any significant influence on stock prices in the long run.

ACKNOWLEDGEMENTS

I would like to express my appreciation to Dr. S.P. Singh for his time and effort spent in the supervision of this thesis, and for his frequent advice and encouragement. I also wish to thank Dr. G.B. Reschenthaler and Professor Richard Plain for serving on my committee.

TABLE OF CONTENTS

CHAPTER I	INTRODUCTION	1
CHAPTER II	THEORETICAL FRAMEWORK OF STUDY	4
	Gross National Product	4
	The Relative Influence of Monetary and Fiscal Policies	11
	The Chicago School	13
	The Keynesians	15
CHAPTER III	METHODOLOGY	19
	Regression Model for the Study	20
	Operational Definitions of the Variables	20
	The Regression Equation	23
	Tests of Assumptions of the Regression Analysis	24
	Linearity	25
	Multicollinearity	25
	Homoscedasticity and Autocorrelation	30
CHAPTER IV	ANALYSIS OF RESULTS	32
	Estimates of the Parameters	33
	Type I Equations	34
	Type II Equations	34
	Interpretation of the Results	40
	Money Supply and Public Spending	40
	Interest Rate	46
	Tax Rate	49

	Summary	51
CHAPTER V	SUMMARY AND CONCLUSIONS	53
	Summary	53
	Conclusions	54
	SELECTED BIBLIOGRAPHY	56
	APPENDIX A	58
	APPENDIX B	63
	APPENDIX C	66
	APPENDIX D	71

LIST OF TABLES

Table		Page
1	Estimates of Parameters of Simple and Multiple Regressions with Type I Equations for Canada	35
2	Estimates of Parameters of Simple and Multiple Regressions with Type I Equations with the U.S.	36
3	Estimates of Parameters of Simple and Multiple Regressions with Type II Equations for Canada	38
4	Estimates of Parameters of Simple and Multiple Regressions with Type II Equations for the U.S.	39
A-1	Stock Price Indexes, Money Supply, Public Spending, Interest Rate and Tax Rate for the Time Period 1949-1967 for Canada	59
A-2	Stock Price Indexes, Money Supply, Public Spending, Interest Rate and Tax Rate for the Time Period 1949-1967 for the United States	60
A-3	Indexes of Stock Prices, Money Supply, Public Spending, Interest Rates, and Tax Rates for the Time Period 1949-1967 for Canada	61
A-4	Indexes of Stock Prices, Money Supply, Public Spending, Interest Rate, and Tax Rates for the Time Period 1949-1967 for the United States	62

B-1	Simple Correlation coefficients Between Independent Variables in case of the Type I Equations for Canada	64
B-2	Simple Correlation coefficients Between Independent Variables in case of the Type II Equations for Canada	64
B-3	Simple Correlation coefficients Between Independent Variables in case of the Type I Equations for the United States	65
B-4	Simple Correlation coefficients Between Independent Variables in case of the Type II Equations for the United States	65
C-1	Estimates of Parameters of the Type I Multiple Regression Equation for Canada with Money Supply and Public Spending, and with Money Supply, Public Spending and Interest Rate	67
C-2	Estimates of Parameters of the Type II Multiple Regression Equations for Canada with Money Supply and Public Spending, and with Money Supply, Public Spending and Interest Rate	68
C-3	Estimates of Parameters of the Type I Multiple Regression Equations for the United States, with Money Supply and Public Spending, and with Money Supply, Public Spending and Interest Rate	69
C-4	Estimates of the Parameters of the Type II Multiple Regression Equations for the United States, with Money Supply and Public Spending, and with Money Supply, Public Spending and Interest Rate	70

CHAPTER I

INTRODUCTION

Since the Second World War, considerable research has been done to analyze the movements of stock prices. Several studies have revealed the importance of trends in economic activity as reflected in gross national product in explaining the movement of the stock prices. However, gross national product itself is largely a reflection of monetary and fiscal policies. Therefore, gross national product is only an intermediate variable between stock prices and monetary and fiscal policies. The controversy regarding the relative influence of monetary and fiscal policies on economic activity has also been extended to stock prices.

The present study is intended to measure the relative and total influence of monetary and fiscal policies on stock prices. Total money supply, public spending, interest rate and tax rate are used as measures of these monetary and fiscal policies. The first two relate to fiscal policy and the latter two relate to monetary policy. Operational definitions of these variables are provided in chapter 3. The objective of this study is twofold:

- (i) to determine the influence of money supply, public spending, interest rate and tax rate on stock prices, and
- (ii) to examine if the influence of these variables, for both Canada and the U.S., are similar on stock prices.

The study will be concerned only with the factors influencing stock prices in the long run. Therefore, technical factors internal to the stock market will be ignored.

In order to determine the influence of money supply, public spending, interest rate and tax rate on stock prices, regression analysis will be used. Stock prices will be considered as the dependent variable with money supply, public spending, interest rate and tax rate considered as the independent variables.

The study will be conducted using Canadian and U.S. data for the time period 1950-1966. Two sets of estimates will

be made from the data. The first set will be based on the assumption that there is no lag between changes in stock prices and any of the independent variables. The second set will be based on the same data, but with a lag of twelve months between the changes in stock prices and money supply.

This study has several important policy implications. The stock market is an important source of equity funds for investment. An understanding of the behavior of the stock market is important to both investors and corporations. A corporation will find this study of use insofar as the prices of stocks influence their financial plans. An investor may use these findings to discover profitable investment opportunities. The findings of the study may also be of some use to public authorities who seek to create a suitable economic environment for investment.

CHAPTER II

THEORETICAL FRAMEWORK OF STUDY

This chapter will review the literature concerning the movement of stock prices. The first part of the chapter examines the influence of the changes in gross national product on stock prices. The second part discusses the controversy concerning the relative influence of monetary and fiscal policies on economic activity and stock price movements.

Gross National Product

The hazard in evaluating stock prices arises partly from the difficulty in choosing the factors that have systematic influence on stock prices. The approach used in the study is concerned with the long term behavior of stock prices. Corporate sales, earnings and dividends

are some of the determinants of the stock prices. However, since the trends in earnings, dividends and sales are themselves a reflection of the trend in economic growth, it is feasible to use this underlying trend as a long run guide. Most of the determinants that have been explored for their relationship with stock prices seem to be connected with economic activity.¹ Since gross national product² is a measure of economic activity, it is reasonable to expect a high degree of correlation between stock prices and GNP.

GNP may influence stock prices in two ways. First, inflationary pressure is reflected in GNP figures when reported in current dollars. However, the changes in the stock prices

¹Weston considers the following determinants to be the most important for stock prices:

- a) the profits and dividends outlook,
- b) the size of the residual income of the public after necessary and customary expenses have been met,
- c) the state of confidence,
- d) money market conditions, particularly as they influence the availability of funds,
- e) the flow of savings into the stock market, and
- f) the tax outlook for both individuals and corporations.

See J. Fred Weston, "The Stock Market in Perspective," Harvard Business Review, March-April, 1956, pp. 71-80. Storer and Conn point out twelve leading business indicators of stock prices. See Robert W. Storer and Mabel V. Conn, "Stock Market Leading Indicators," Financial Analysts Journal, September-October 1961, pp. 61-64.

²Hereinafter referred to in this paper as GNP.

due to changes in general price level are not the result of any change in the level of economic activity, but merely reflect a rising price level in the economy. As Cooke states:

A residual equity instrument such as common stock, has a tendency to rise in value with the increase in dollar dividends per share to compensate for the change on consumer prices.³

Secondly, GNP influences stock prices because of a fundamental relationship between these two variables.

There is increasing evidence that expansions and contractions of business activity have an effect upon stock prices. Bratt has suggested that stock prices tend to reach a trough several months in the lead of an impending trough in business cycles. They reflect the expectations of major stock owners who possess an understanding of business conditions.⁴

The movement of stock prices does not have a continuous upward or downward trend. An examination of the behavior of stock prices for different time periods indicates that there

³Gilbert W. Cooke, The Stock Market (New York: Simmons-Boardman Publishing Corporation, 1964), p. 365.

⁴Elmer Bratt, Business Cycles and Forecasting, (5th ed., Homewood, Illinois: Richard D. Irwin, 1961), p. 385.

are short term, intermediate, and long-term cycles. As early as 1900, Charles H. Dow wrote:

The market is always to be considered as having three movements, all going on at the same time. The first is the narrow movement from day to day. The second is the short swing running from two weeks to a month or more; the third is the main movement covering at least four years in its duration.⁵

The authors of the Dow theory intended to describe a pattern of stock price movements which would predict general business cycles. The main movements in stock prices are primarily influenced by the economic conditions of a nation, and GNP is an important yardstick of these economic conditions.

Weston examined the long-term relationship between stock prices and aggregate economic activity for the U.S. and found that they were closely related.⁶ To examine the relationship between the above mentioned variables, Weston developed a regression equation with the stock prices as the dependent variable. For the time period 1909 to 1940 (excluding the period 1928 to 1932 which was considered unusual), the

⁵National Observer, June 10, 1961, p. 10.

⁶J. Fred Weston, op. cit.

following estimates of the parameters of the regression equation were obtained:

$$SP = 15.58 + .7468 \text{ GNP}$$

SP is the stock price as represented in Standard and Poor's Industrial Index, where 1935-1939 = 100, and GNP represents aggregate economic activity measured in billions of dollars of 1953. For the time period between 1868 and 1928, the parameters of the regression equation were estimated as:

$$SP = 14.23 + .7488 \text{ GNP}.$$

Weston averaged the coefficients of the two equations and stated the relationship between stock prices and aggregate economic activity as:

$$SP = 15 + .75 \text{ GNP}.$$

This equation indicates that the level of stock prices, as measured by Standard and Poor's Industrial Index, is approximately 0.75 times the current level of GNP, plus a constant of approximately 15 index points. In order to test the predictive power of the equation, Weston used it to estimate the level of 1955 stock prices, and found that the equation accounted for 90 percent of the actual value in Standard and Poor's Industrial Index.

It may be emphasized that the study pertained to the general level of the stock prices and not to any individual company or industry. The study also revealed cyclical patterns in stock prices with a general upward trend. Similar findings were obtained by an empirical study by Solomon for the U.S.⁷

The above studies sought a single causal factor for explaining stock price movements. However, it is important that the influence of other factors on stock prices, such as corporate profits and dividends, also be considered. In order to incorporate these factors, Krishna developed a multiple regression equation with three independent variables: GNP, corporate earnings, and dividends.⁸ The objective was to determine the relative influence of these variables on stock prices. He used Canadian data for the time periods 1935 to 1966 and 1946 to 1966. He obtained the following estimates

⁷Ezra Solomon, "Economic Growth and Common Stock Values," Journal of Business, XXVIII, July 1955, pp. 213-221.

⁸Virendra Krishna, Factors Influencing Stock Prices in Canada in the Long Run. unpublished M.B.A. thesis, The University of Alberta, 1969.

for the latter time period, using 1949 dollars:

$$Y = -192.45 + .012X_1 + .091X_2 + .031X_3$$

(4.29) (1.29) (.23)

where, Y = stock price average (1949 = 100)

X_1 = GNP in millions of dollars

X_2 = corporate profits before taxes in millions of
dollars

X_3 = dividends paid in millions of dollars.

The t-value figure, shown in brackets below the regression coefficients, was significant for GNP alone at the 1 percent level.

The results of these studies suggest that GNP is significantly related to stock prices. However, economic theory suggests that economic activity, for which GNP is a measure, is related to monetary and fiscal policies.⁹

⁹For discussion on the relative influence of monetary and fiscal actions on economic activity, see Leonall C. Anderson and Jerry L. Jordan, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," Review - Federal Reserve Bank of St. Louis, November 1968, pp. 11-24; and Michael W. Keran, "Monetary and Fiscal Influences on Economic Activity: The Historical Evidence," Review - Federal Reserve Bank of St. Louis, November 1969, pp. 5-24.

Therefore, it is important to investigate the relationship between stock prices on one hand, and monetary and fiscal policies on the other.

The Relative Influence of Monetary
and Fiscal Policies

Monetary policy in the U.S. is largely determined by the Department of the Treasury and the Federal Reserve System. In Canada, these monetary decisions are taken by the Bank of Canada. They consist of variations in cash holdings by the Treasury or the Bank of Canada, deposits at the Federal Reserve banks or at commercial banks, issuance of currency, changes in portfolio of government securities, variations in reserve requirements for member banks, and changes in the discount rate.¹⁰

The influence of fiscal actions on economic activity is frequently measured in terms of federal government spending, changes in federal tax rates, or federal budget deficits and surpluses. The elementary view concentrates almost exclusively on the direct influence of fiscal policy on total spending.

¹⁰Anderson and Jordan, op. cit., p. 13.

Government spending is a direct demand for goods and services, but tax rate is also an important factor. Tax rates affect personal disposable income, a major determinant of consumer spending, as well as business profits, a major determinant of investment spending.

The relative influence of monetary and fiscal policies on economic activity has been subject to a great deal of controversy among economists for many years. This controversy has principally involved "The Chicago School" -- money matters -- and Keynesians and neo-Keynesians -- money is relatively passive.¹¹ Although the controversy centres mainly on the relative influence of monetary and fiscal policy on economic activity, it has been extended to effects on stock prices by the proponents of these opposing views.

¹¹Professors Friedman and Selden have presented the "Chicago" view in several writings, while Professor Ritter and many others have outlined a neo-Keynesian position. See Milton Friedman, "The Supply of Money and the Price Level," in Deane Carson, Money and Finance (New York: John Wiley & Sons, Inc., 1966) pp. 145-154, Milton Friedman, "Postwar Trends in Monetary Theory and Policy," The National Banking Review, September 1964, pp. 1-10, and Lawrence S. Ritter, "The Role of Money in Keynesian Theory," in Deane Carson, The Essays in Banking and Monetary Studies (Homewood: Richard D. Irwin, 1963) pp. 134-150.

The Chicago School

Several studies have been conducted by proponents of "the Chicago School" to show the effects of changes in money supply on stock prices. Salz in his two articles focuses on money supply to show that it is the most important causal factor on stock prices.¹² He observes that every substantial increase in stock prices has been associated with a spurt in the money supply. He examines data from 1872 to 1962 to support his views. He then reasons that future increases in stock prices will be dependent upon sharp increases in the money supply. The basic implication of the position taken by Salz is that a rise in common stock values can come about only if it is stimulated by a high rate of increase in money supply. This relationship between money supply and stock prices is also emphasized by Poole.¹³

Beryl Sprinkle makes the most articulate case for the influence of money supply. He shows that the direction

¹²Frank Salz, "Is the Investor Facing Bleak Years Ahead?" Financial Analyst Journal, September-October and November-December, 1964, pp. 33-40, 31-40.

¹³Alan C. Poole, "Relationship of Money Market and the Economy," The Commercial and Financial Chronicle, September 8, 1966, pp. 1, 20-23.

of changes in money supply causes changes in a corresponding direction in stock prices and in the level of economic activity.¹⁴ The demand for money is a function of income and interest rates. A high level of income (and hence transaction needs for cash) increases the demand of money at a given price (interest costs). Interest is the cost of maintaining liquidity. Hence, if liquidity is reduced by monetary contraction, spending units will seek to build up their liquidity by selling less liquid assets such as common stocks and by reducing expenditures relative to income. Thus a monetary contraction will cause a decline in total demand and stock prices to fall.

Sprinkle concludes from his study that stock prices are closely associated with the rate of change in money supply. He indicates that changes in monetary growth typically precede changes in equity prices, which in turn, usually

¹⁴Beryl W. Sprinkle, Money and Stock Prices (Homewood, Illinois: R.D. Irwin, Inc., 1964) pp. 126-133. This book seems to represent a more balanced appraisal of the relationship between money supply and stock prices than the extreme position expressed by Salz. It is one thing to argue that there is a relationship between money supply and stock prices and another to make predictions on the basis of this relationship.

move in advance of overall business fluctuations. He finds this evidence consistent with his hypothesis that monetary changes influence total spendings and cyclical fluctuations.

By relating liquidity changes, stock prices and business cycles, he found that changes in stock prices lagged monetary changes by 15 months and business activity by 20 months during a bear market. Thus stock price trends lead trends in business activity by five months prior to a bear market. In the case of bull market, he found the average lead time for monetary change to be only two months.

The Keynesians

The views held by the proponents of the Chicago School are not accepted by the other group, who believes that there are many other variables, besides money supply, which influence stock prices. Weston and Eitman argue that the influence of money supply on economic activity is not clearly established.¹⁵ In their judgement, the evidence that money supply leads and determines changes in stock prices and business activity is

¹⁵J. Fred Weston and David K. Eitman, "Economic Trends and Security Values -- A Bleak or Bountiful Future for Investors?" Financial Analysts Journal, January-February 1965, pp. 21-32.

questionable. Under certain circumstances, significant changes in money supply could influence the level of business activity and stock prices, but other factors could produce similar effects.¹⁶ A sharp change in the level of government spending, a change in tax rates (or a promise of change), a wage settlement that was considered high or low, tax rules which permitted a rapid write-off of equipment, a change in tariff practices by another large industrial country, and many other factors could influence the level of business activity and stock prices. Due to the presence of innumerable other possible influences on business activity, it may not be advisable for investors to rely on monetary indicators as the sole guide to stock prices.¹⁷

While reviewing the articles by Bordon Helmer¹⁸ and Frank Salz,¹⁹ Weston and Eitman point out a trap in relying upon historical episodes.²⁰ In the United States, fiscal

¹⁶Ibid., p. 24.

¹⁷Ibid., p. 24.

¹⁸Bordon Helmer, "Economic Perspective for Planning," Financial Analysts Journal 20, July-August 1964, pp. 23-30.

¹⁹Frank Salz, op. cit.

²⁰Weston and Eitman, op. cit., p. 26.

policy was relatively moderate up to the late thirties, after which the relative size of government spending increased. The great increase in spending did not occur, however, until World War II spending was financed by the sale of bonds through the banking system.

In view of the above discussion and the existing controversy on the effect of monetary and fiscal actions on stock prices, it is hypothesized in the present study that, in a long-term and on macroeconomic basis, both monetary and fiscal policies influence stock prices.

The monetary policy for both Canada and the U.S. can be determined by the total supply of money as defined by the International Monetary Fund in its International Financial Statistics, and the discount rates of the central banks. Possible measures of fiscal policy are total government spending (including transfer payments as well as purchases of goods and services), and tax receipts. In addition to money supply and interest rates, therefore, public spending and tax rates will be chosen as independent variables in the present study, which will attempt to determine their

relative and total influence on stock prices in Canada and
the U.S.

CHAPTER III

METHODOLOGY

This chapter outlines the methodology that is used in this study to determine the influence of money supply, public spending, interest rate, and the tax rate on the stock prices. The study uses simple and multiple regression analyses to explain the stock price movements.

The chapter is divided into two parts. The first part discusses the regression model to be used in the study, the nature of the variables, and the sources of the data. The second part discusses the assumptions underlying the regression analysis and their implications to the results of the present study.

Regression Model for the Study

In the present study, which uses regression analysis to estimate the relative and total influence of monetary and fiscal policies on stock prices, the stock price average is the dependent variable and the supply of money, the rate of public spending, the interest rate, and the tax rate are the independent variables.

Operational Definitions of the Variables

The stock prices are represented by the index numbers of the market prices of industrial shares of common stocks traded on the leading exchanges of the respective countries.¹ These figures, obtained from the various issues of the United Nations Statistical Yearbook,² are presented in Appendix A, Tables 1 and 2. As the base years for the available indexes vary, these indexes have been converted to a common base year

¹The selection of industrial stocks is made for two reasons. First, industrial stocks represent a very large segment of the whole economy. Second, a composite index of stocks based on all major sectors of economy is not available.

²United Nations Statistical Yearbook (New York: Publishing Service, United Nations), various issues between 1948 to 1968.

of 1963, i.e. the index number of the stock price average for 1963 is 100. These converted index numbers are shown in Appendix A, Tables 3 and 4.

The figures for the total supply of money in both Canada and the U.S. include all the currency and total demand deposits in the domestic private sectors.³ These figures have been obtained from International Financial Statistics,⁴ and are presented in Appendix A, Tables 1 and 2. These figures have also been converted to index numbers with 1963 as the base year and are shown in Appendix A, Tables 3 and 4.

Public spending for both countries is represented by total government expenditures as shown in their national

³This definition of money supply is arbitrary selected. It is difficult to select any meaningful definition of money supply on theoretical arguments. The only defensible reasons for the restrictive definition of money used in this study are that the concept is simple and money so defined is apparently as closely related to economic events as would be money more broadly defined.

⁴International Financial Statistics (Washington, D.C., International Monetary Funds) various issues between 1949 to 1968.

accounts.⁵ These figures have been obtained from the United Nations Statistical Yearbook,⁶ and are presented in Appendix A, Tables 1 and 2. The converted index numbers with 1963 as the base year appear in Tables 3 and 4 of Appendix A.

The interest rates used in this study are the discount rates of the central bank of each country.⁷ They have also been converted to index numbers with 1963 as a base year. The original figures are shown in Appendix A, Tables 1 and 2; and the converted index numbers are shown in Tables 3 and 4.

⁵For Canada, these accounts include agriculture, defence, public works, transports, veterans' benefits, social service benefits, transfers to old age security fund, health and hospital care, payments to provinces, interest on public debt and other miscellaneous items. For the U.S., these accounts include national defence, international affairs and finance, space research and technology, agriculture and agricultural resources, natural resources, commerce and transportation, housing and community development, health, labour and welfare, education, veterans' benefits and services, interest on public debts, deposits funds, and some other items and adjustments.

⁶Statistical Yearbook, op. cit.

⁷There are several interest rates prevailing in an economy. The selection of discount rates of the central banks for this study is made because a government regulates interest rates in the economy by the central bank discount rate. Therefore, monetary policy of a government is better reflected in central bank's discount rate than in any other interest rate.

Tax rates in this study represent the average tax rate levels in the economy. They include personal and corporate income taxes, and other direct and indirect taxes, but exclude the payroll taxes. The total taxes collected in a year are divided by the national income of that year. The resulting annual average tax rates for both Canada and the U.S. for the period 1950 to 1966, appear in Tables 1 and 2 of Appendix A. These tax rates are also converted to index numbers with 1963 as the base year, and are presented in Appendix A, Tables 3 and 4. The figures on taxes and the national income for this period in both Canada and the U.S. have been obtained from the United Nations Statistical Yearbook.⁸

The Regression Equation

The index numbers for the price of stock, money supply, public spending, interest rate and tax rate are subjected to time-series regression for the period 1950 to 1966. The regression equation can be represented by the following equation:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + U$$

where Y represents the actual value of the stock price index; X_1 , X_2 , X_3 and X_4 represent indexes for the total supply of money, public spending, interest rate, and tax rate respectively.

⁸Ibid.

The constant term, a , represents the intercept of the regression line; the terms b_1 , b_2 , b_3 and b_4 represent the regression coefficients of X_1 , X_2 , X_3 and X_4 respectively. The term U represents the difference between the estimated and the observed values of the dependent variable.

The deviation of the estimated values from the actual values may be due to any of the following factors. First, it is likely that the relationship between the dependent and the independent variables is not exactly linear, although this departure from exact linear dependency is not enough to warrant a curvilinear regression. Second, statistics on economics frequently contain errors of measurement, so that they are only an approximation to the underlying "true" values. Third, there may be independent variables which significantly affect the dependent variable but are not included in the regression equation.

Tests of the Assumptions of the Regression Analysis

Usually a regression is performed on data which are a representative sample of a specific population. From the results of the regression, statistical inferences can be made regarding the population. The validity of such inferences is directly dependent on the extent to which the assumptions of the regression analysis are satisfied. The tests performed to check the validity

of these assumptions relative to this study are discussed below.

Linearity

The validity of the assumption of linearity in the present study is tested graphically. The stock price indexes are plotted separately against the indexes of the total money supply, public spending, interest rates and tax rates for both Canada and the U.S. The resulting graphs are presented in Figures 1 through 4. The graphs indicate an approximately linear relation between the dependent and each of the independent variables.

Multicollinearity

A high degree of correlation between any two of the independent variables makes the coefficients of the independent variables unreliable by increasing the size of their standard errors. In this study the problem of multicollinearity is severe because of a high degree of correlation between money supply and public spending. However, it needs to be emphasized that it does not distort the predictive power of the total regression equation. The interdependence

FIGURE 1

TEST FOR LINEARITY WITH CANADIAN DATA

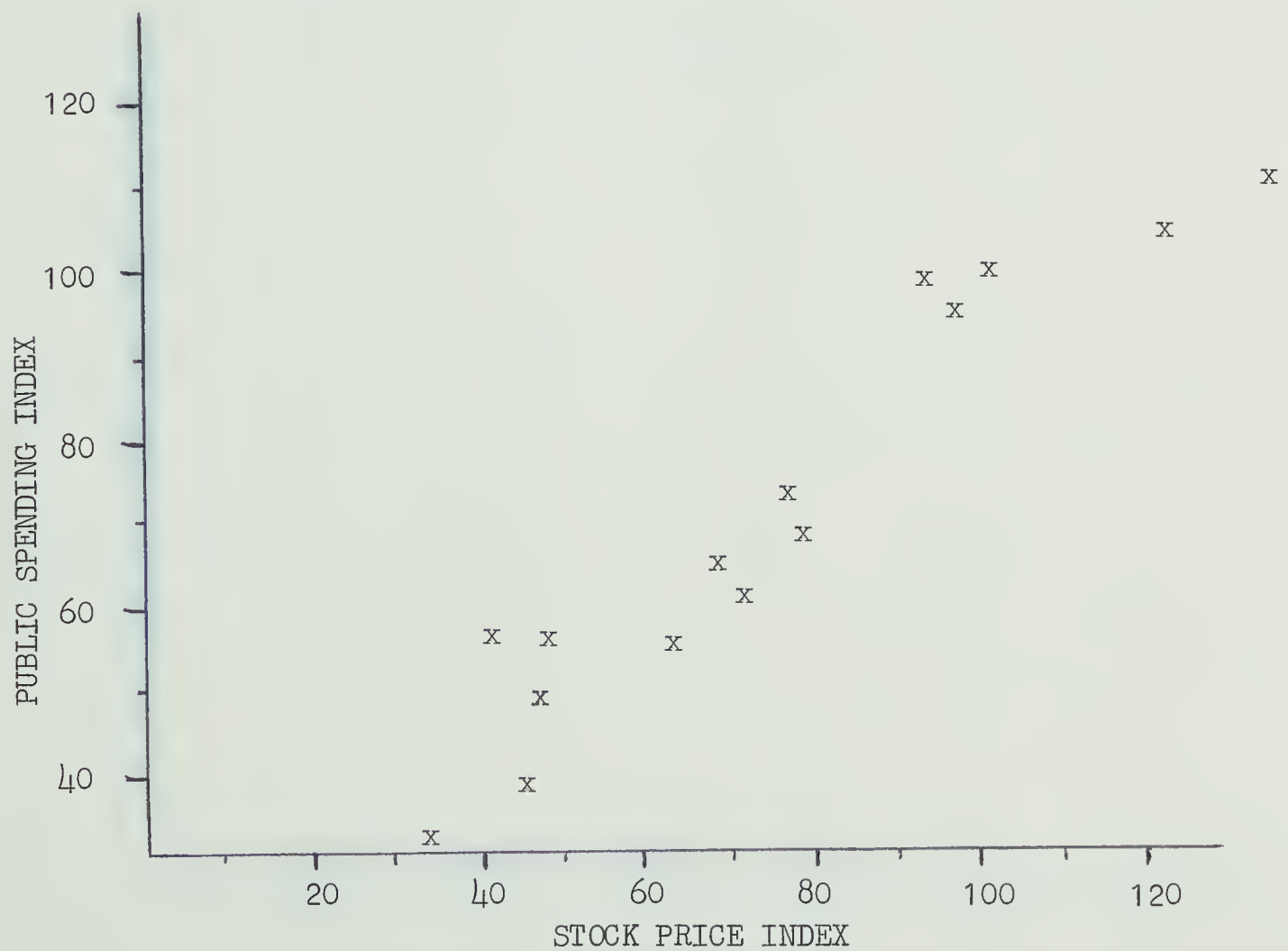
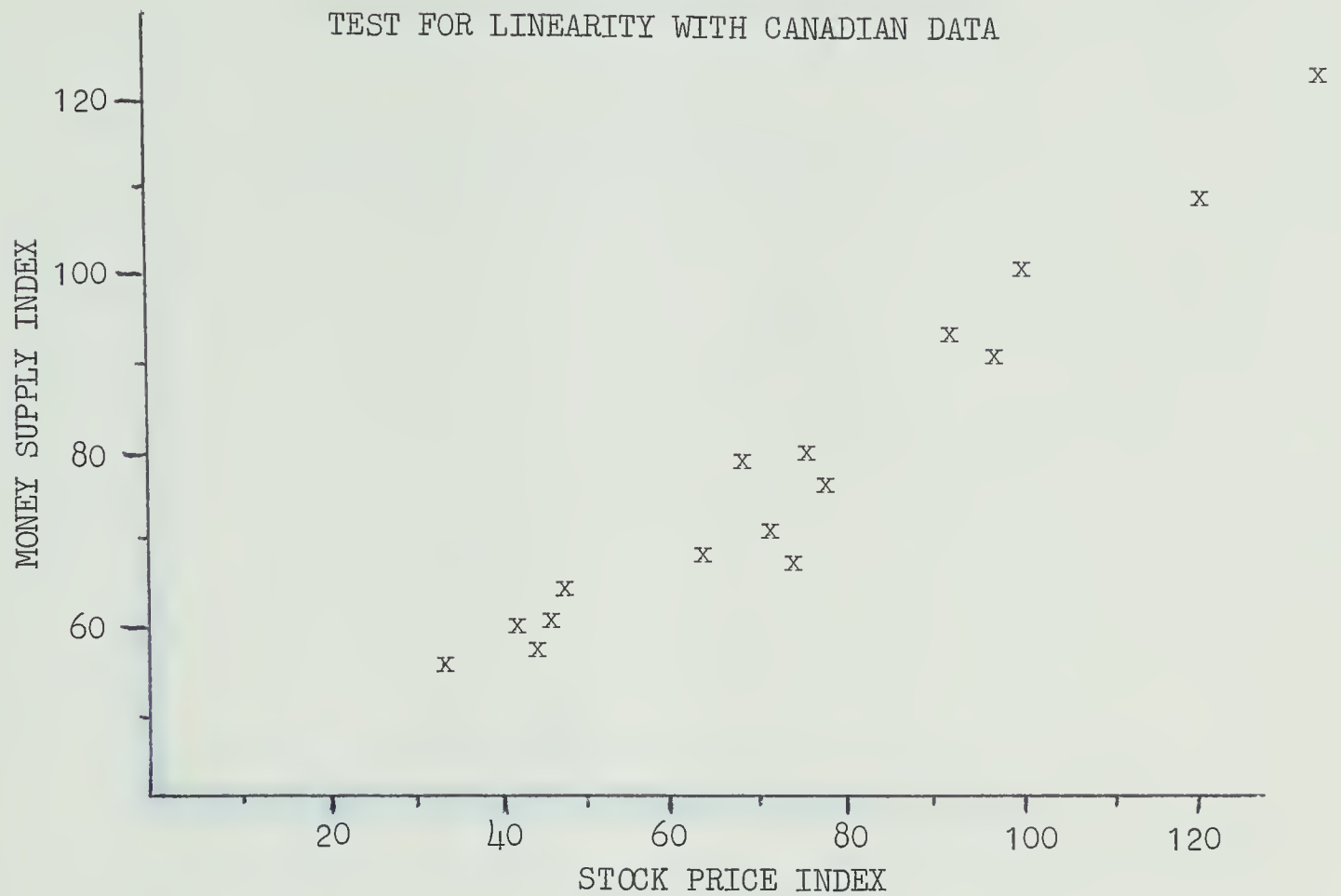




FIGURE 2

27.

TEST FOR LINEARITY WITH CANADIAN DATA

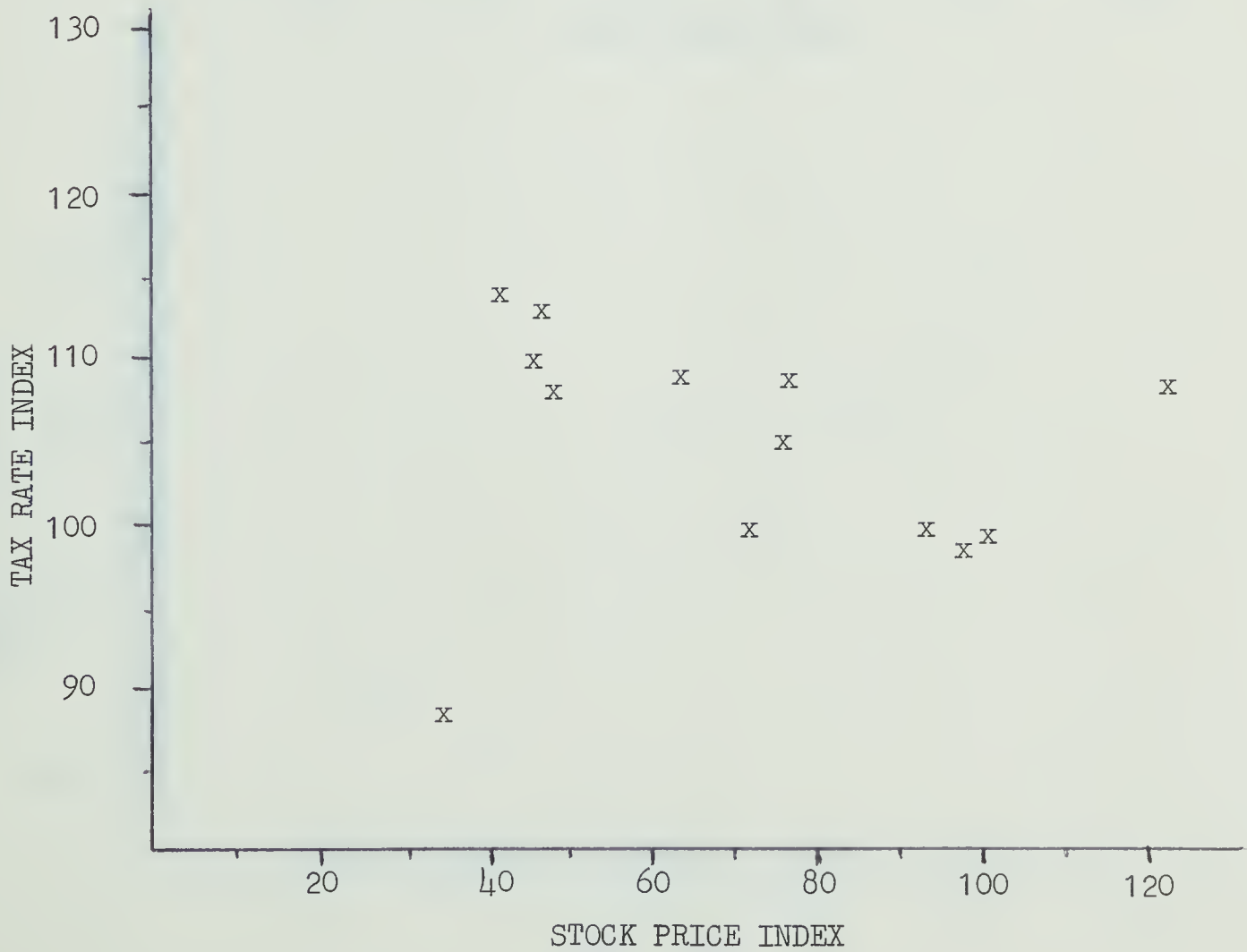
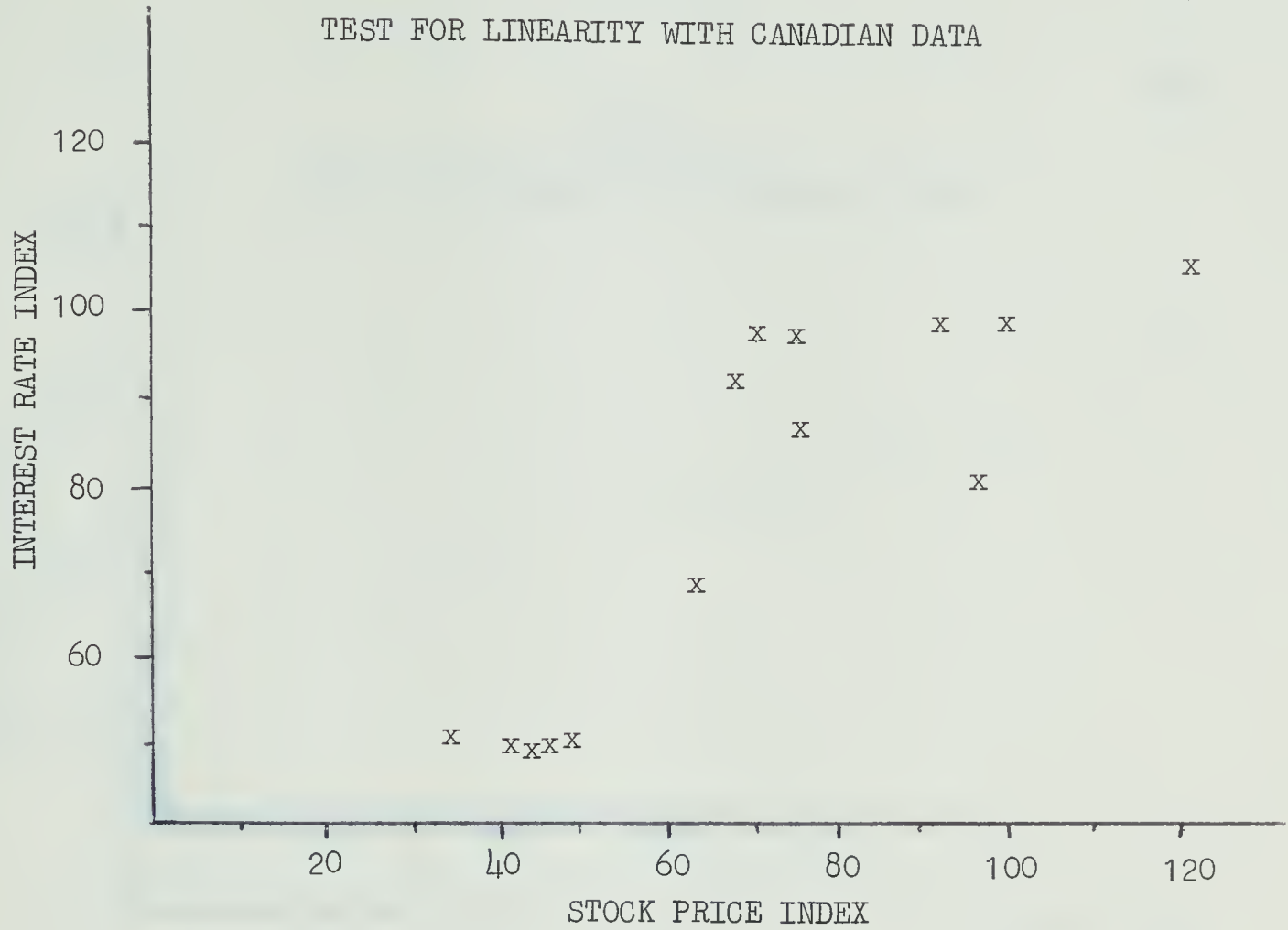




FIGURE 3
TEST FOR LINEARITY WITH THE U.S. DATA

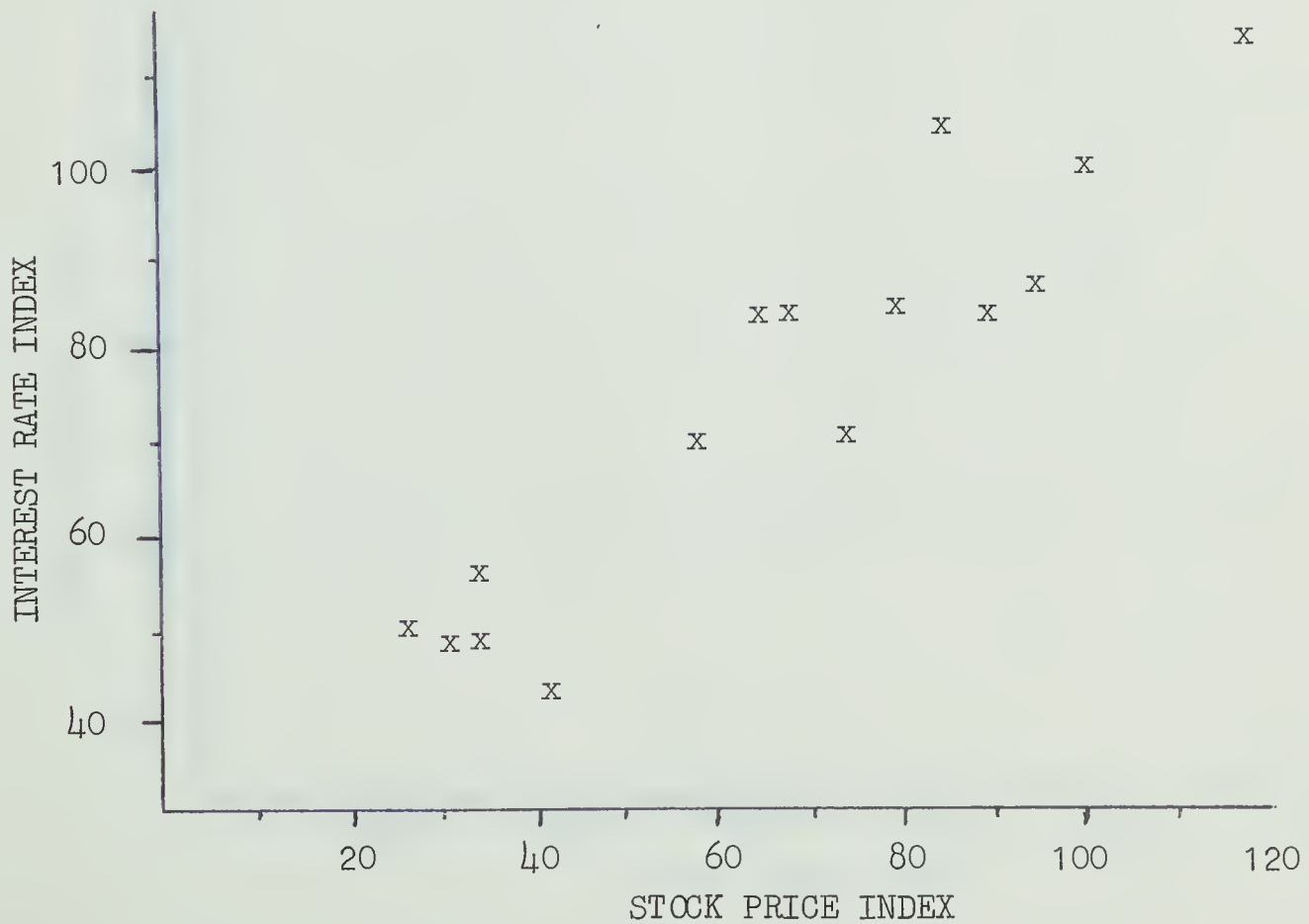
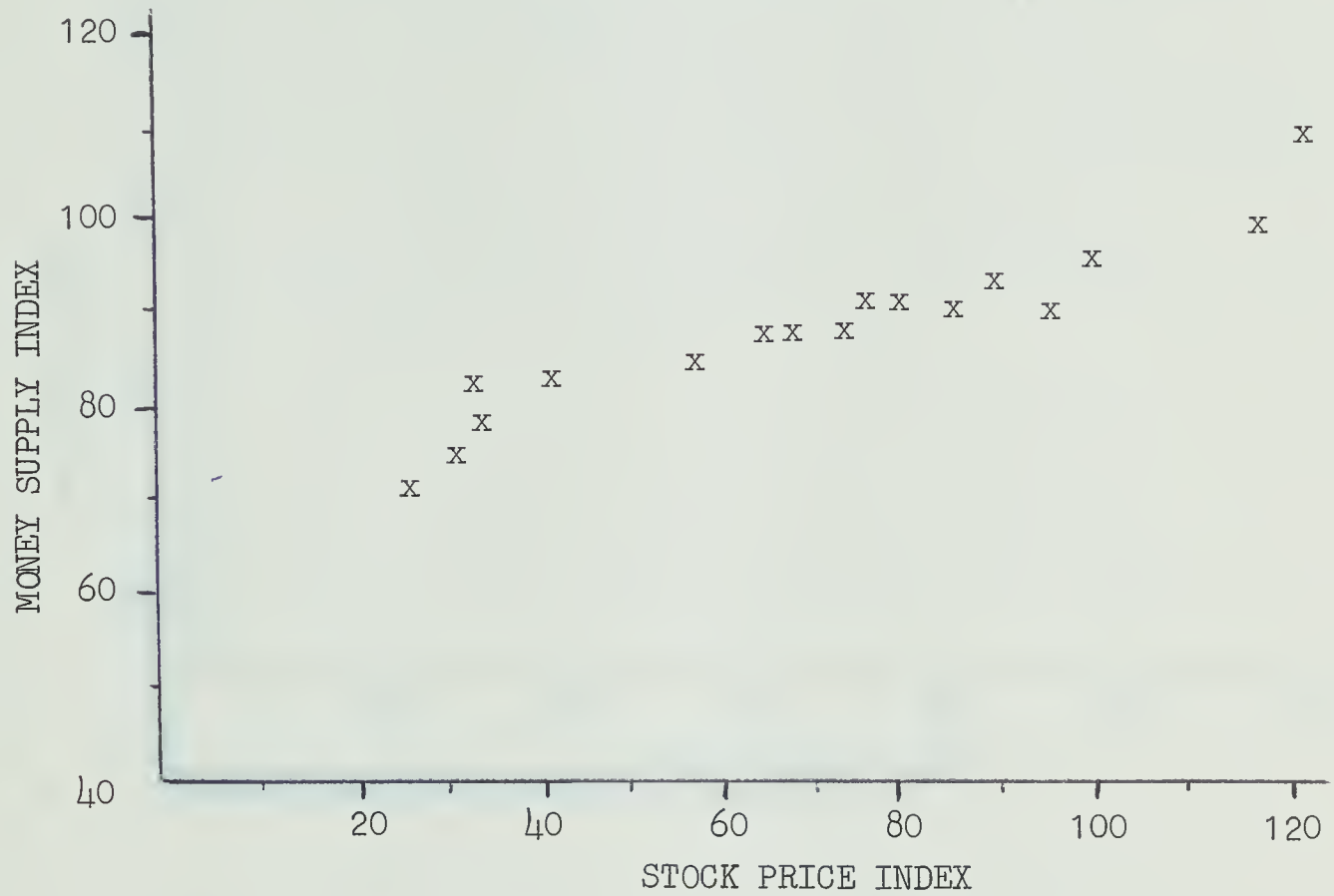
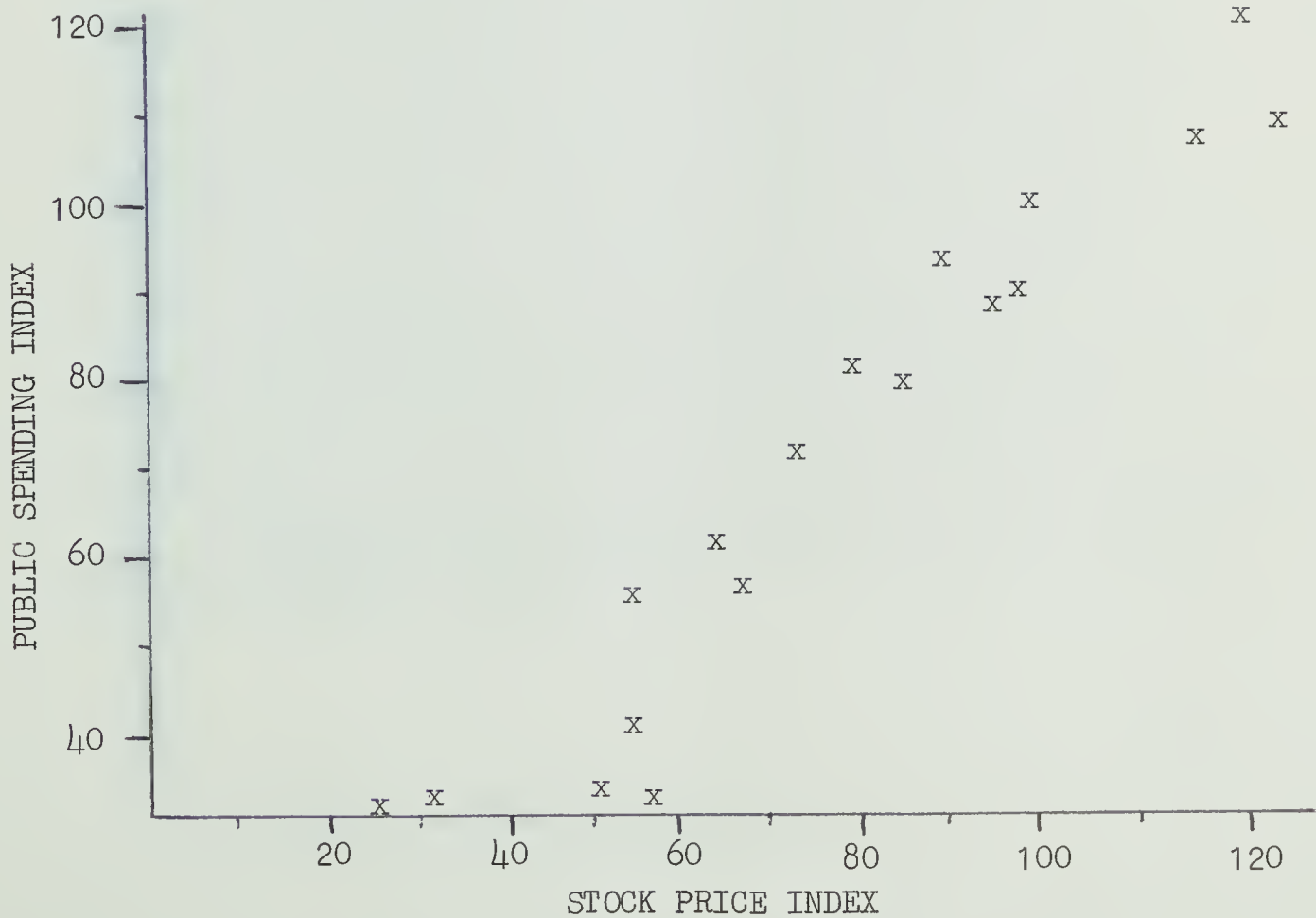
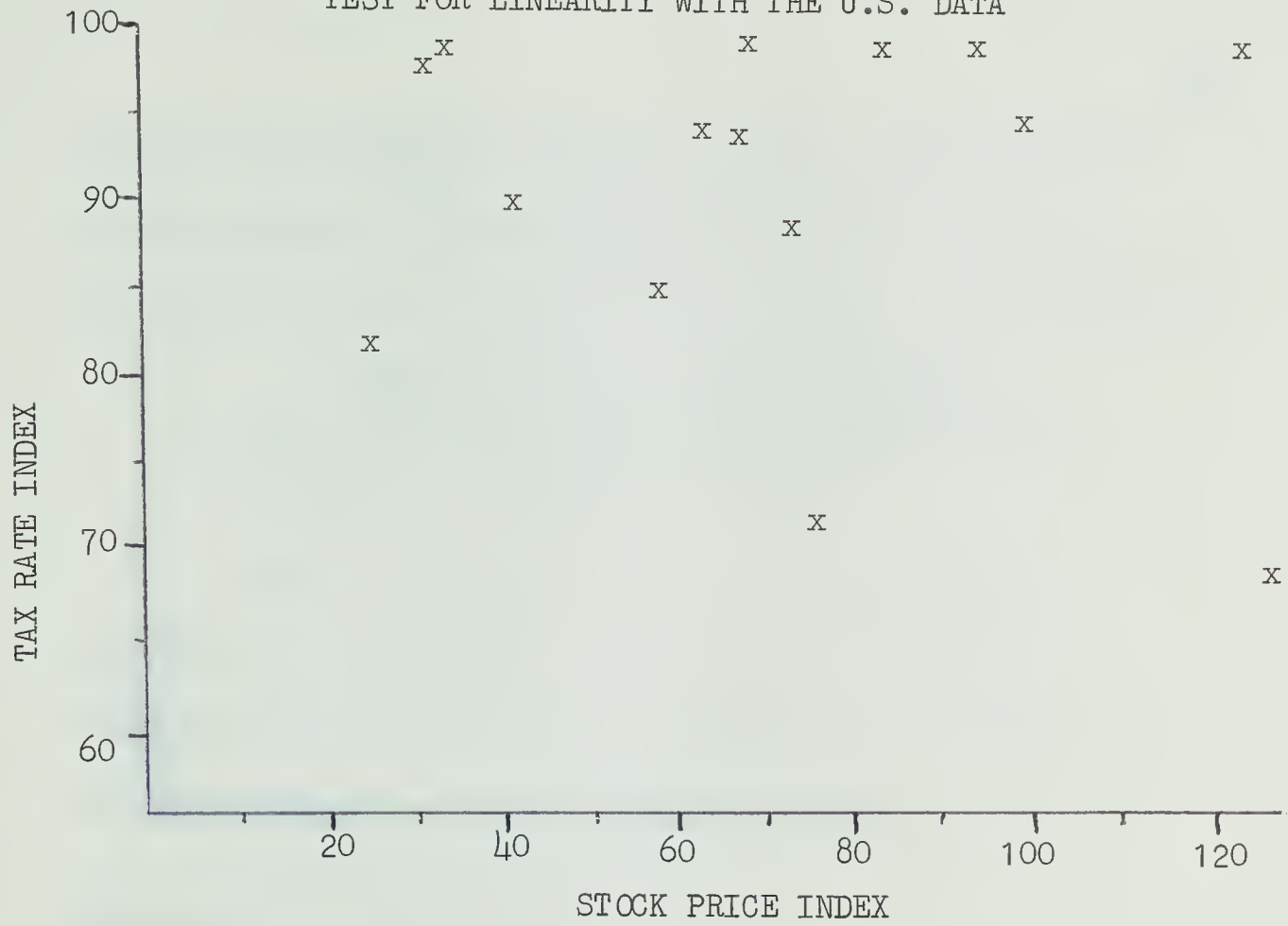


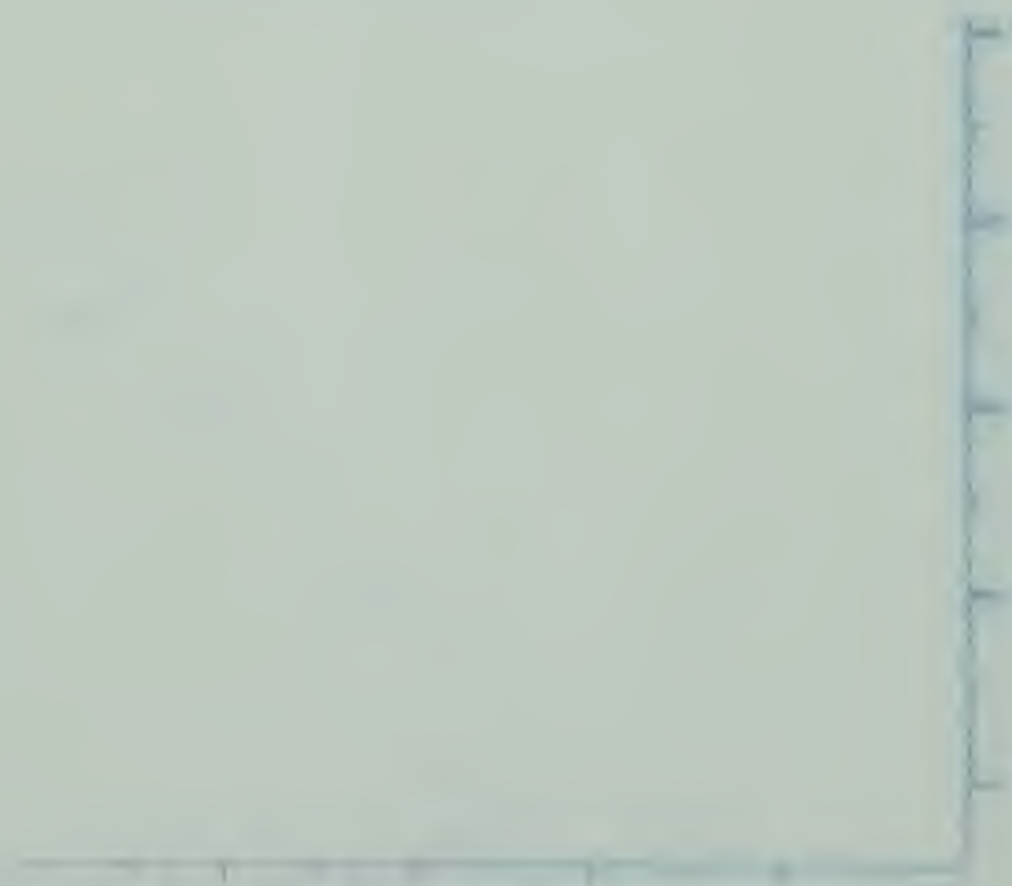


FIGURE 4

29.

TEST FOR LINEARITY WITH THE U.S. DATA





between the independent variables is not a serious problem for the purpose of forecasting as long as there are no important structural changes in the economy. Johnston states:

If forecasting is a primary objective, the correlation of explanatory variables may not be too serious, provided it may reasonably be expected to continue in future.⁹

Since the predictive power of the regression equation is not seriously hampered by the problem of multicollinearity, meaningful conclusions can be drawn in spite of it.

Homoscedasticity and Autocorrelation

Two assumptions of the regression analysis are related to the disturbance term in the equation. The term U , which is also referred to as the residual value, should be normally distributed with an expected value of zero and should have a constant standard deviation for different numbers of observations. The latter property of the residuals is known as homoscedasticity. It implies that

⁹J. Johnston, *Econometric Methods* (New York: McGraw-Hill Book Company, 1963), pp. 207.

the residual values are uniformly dispersed around the regression line. If the requirement of homoscedasticity is not satisfied, a mathematical transformation of data is needed to produce the desired dispersion of the residuals.

The other assumption concerning the residuals is related to the presence of a high degree of serial correlation in any of the independent variables. The presence of autocorrelation implies that the residuals are not randomly distributed around the regression line.

An important test for autocorrelation is the Durbin-Watson statistic, represented by d ,¹⁰ which was calculated for this study. The computed values of d suggest that there is no serial autocorrelation in the residuals.

¹⁰For a detailed discussion on Durbin-Watson statistic, see J. Durbin and G.S. Watson, "Testing for Serial Correlation in Least Square Regression," *Biometrika*, Vol. 38 (1951), pp. 159-177.

CHAPTER IV

ANALYSIS OF RESULTS

This chapter discusses the results obtained through simple and multiple regression equations. These equations were formulated to examine the influence of money supply, public spending, interest rates and tax rates on stock prices.

The chapter is divided in three parts. The first part presents the estimates of the parameters obtained through the regression equations. This is followed by the interpretation of the results in the second part. The discussion is carried within a theoretical framework to draw meaningful conclusions. The third part summarizes the chapter.

Estimates of the Parameters

This section examines the estimates of the parameters obtained through the regression equations. Two types of regression equations have been formulated. In the first type, it is assumed that changes in stock prices follow shortly after any changes in one or more of the chosen independent variables, i.e. money supply, public spending, interest rate and tax rate. These equations will be called type I equations for convenience in discussion later in the chapter.

The second type of equation is of the same nature and uses the same data except that an average of twelve months lead for the supply of money was allowed over the stock price. That is, the indexes for the supply of money for each year were used to form correspondences with the stock price indexes of the succeeding years. As was mentioned earlier, the type I and type II equations were developed in the following form:

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + U,$$

where Y is the index for the stock price averages; X_1 , X_2 , X_3 and X_4 are the indexes for money supply, public spending,

interest rate and tax rate.

The type I and type II equations were applied to both Canada and the U.S.

Type I Equations

The stock price indexes for Canada increased from 34 in 1950 to 128 in 1966. The corresponding figures for the U.S. were 25 and 124. The results obtained from the type I equation for both countries are summarized in Tables 1 and 2 respectively.

For both Canada and the U.S., the correlation coefficients between the independent variables are high. The correlation coefficient between the money supply and the public spending is 0.97 for Canada and 0.96 for the U.S. The correlation coefficients between the other independent variables are shown in Appendix B, Tables 1 and 2.

Type II Equations

The estimates of the parameters obtained from type II equations for Canada and the U.S. are summarized in Tables 3 and 4. Essentially, these results are similar

TABLE 1
ESTIMATES OF PARAMETERS OF SIMPLE AND
MULTIPLE REGRESSIONS WITH TYPE I EQUATIONS
FOR CANADA

Variables	Simple Regression				Multiple Regression			
	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)
Intercept	-25.19	-0.34	1.44	-32.30	-----	-1.93	-----	-----
Coefficient	1.26	1.06	0.88	1.034	0.73	0.32	0.20	-0.20
T-Value	13.89*	12.00*	5.62*	1.14	2.16 ⁺	1.16	1.88	-0.79
F-Value	192.93*	144.19*	31.57*	1.29	-----	61.16*	-----	-----
Standard Error of Estimate	8.59	9.82	18.16	30.69	-----	7.73	-----	-----
r^2/R^2	0.9278	0.9057	.6779	.7954	-----	0.9532	-----	-----
Durbin-Watson Statistic						1.726		

*Significant at the 1 percent level

+Significant at the 5 percent level

TABLE 2

ESTIMATES OF PARAMETERS OF SIMPLE AND MULTIPLE REGRESSIONS

WITH TYPE I EQUATIONS FOR THE U.S.

Variables	Simple Regression				Multiple Regression			
	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)
Intercept	-206.21	-14.50	-21.11	-71.09	-----	-33.00	-----	-----
Coefficient	3.04	1.19	1.14	0.02	0.45	0.66	0.41	-0.19
T-Value	13.93*	13.92*	10.48*	.024	0.58	2.21 ⁺	2.84 ⁺	0.93
F-Value	194.23*	193.93*	109.94*	.005	-----	92.65*	-----	-----
Standard Error of Estimate	9.26	9.26	11.98	34.58	-----	6.84	-----	-----
r^2/R^2	.9283	.9282	0.8700	.000037	-----	0.9686	-----	-----
Durbin-Watson Statistic						1.772		

*Significant at the 1 percent level

+Significant at the 5 percent level

to those obtained from the type I equations. Here also, the correlation coefficients between the independent variables are very high. The correlation coefficients for the supply of money and public spending for both Canada and the U.S. are 0.96. The correlation coefficients between the supply of money and the interest rate for Canada and the U.S. are 0.81 and 0.92 respectively. Tables 3 and 4 in Appendix B present the values of the simple correlation coefficients among all the variables for Canada and the U.S. As shown, the problem of multicollinearity is equally severe in this case.

The multiple regression equations of both the type I and II were also used to estimate the size of standard errors of estimate and the values of the R^2 for different combinations of independent variables. First, two independent variables, i.e. the supply of money and the public spending, and then three independent variables, including the above two plus interest rate, were used. The estimates of the parameters of these equations for both Canada and the U.S. are presented in Appendix C, Tables 1 to 4. The introduction of interest rate variable in all cases reduces the value of the standard

TABLE 3

ESTIMATES OF PARAMETERS OF SIMPLE AND MULTIPLE REGRESSIONS
WITH TYPE II EQUATIONS FOR CANADA

Variables	Simple Regression				Multiple Regression			
	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)
Intercept	-35.76	-0.34	1.44	-32.30	-----	5.02	-----	-----
Coefficient	1.47	1.06	0.88	1.034	0.57	0.56	0.17	-0.25
T-Value	12.45*	12.00*	5.62*	1.14	1.18	1.90	1.23	-0.87
F-Value	155.03*	144.19*	31.57*	1.29	-----	48.51*	-----	-----
Standard Error of Estimate	9.50	9.82	18.16	30.69	-----	8.63	-----	-----
r^2/R^2	.9110	0.9057	.6779	.7954	-----	0.941	-----	-----
Durbin-Watson Statistic	1.776							

*Significant at the 1 percent level

TABLE 4

ESTIMATES OF PARAMETERS OF SIMPLE AND MULTIPLE REGRESSIONS
WITH TYPE II EQUATIONS FOR THE U.S.

Variables	Simple Regression				Multiple Regression			
	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)	Tax Rate (X_4)
Intercept	-211.97	-14.50	-21.11	70.09	-----	4.05	-----	-----
Coefficient	3.19	1.19	1.14	0.02	-0.04	0.83	0.44	-0.26
T-Value	13.58*	13.92*	10.48*	0.02	-0.05	2.93 ⁺	2.74 ⁺	-1.37
F-Value	184.56*	192.93*	109.94*	0.00056	-----	90.09*	-----	-----
Standard Error of Estimate	9.48	9.27	11.98	34.58	-----	6.94	-----	-----
r^2/R^2	.9148	0.9282	0.8790	0.00003	-----	0.9677	-----	-----
Durbin-Watson Statistic						2.03		

*Significant at the 1 percent level

+Significant at the 5 percent level

error of estimates and increases the value of R^2 . The introduction of tax rate further increases the value of R^2 , but it also increases the size of standard errors of estimate. However, this increase in the size of standard errors of estimate is not appreciable. Hence the final multiple regression equation includes all the four independent variables.

Interpretation of the Results

Money Supply and Public Spending

The coefficients of the supply of money and the public spending for both Canada and the U.S. are positive and significant at the 1 percent level, in the simple regression. This is true for both type I and type II equations. In the multiple regression with Canadian data, the coefficient of money supply alone is significant at the 5 percent level in the type I equation. The coefficients of the other independent variables are statistically insignificant. In the case of the type II equations, none of the coefficients is statistically significant, in the multiple regression equation.

For the U.S., in the multiple regression, the coefficient of public spending is significant at the 5 percent

level in both type I and type II equations. However, the coefficient for money supply is not statistically significant. Further, in the case of the U.S., the coefficient for money supply in the type II equation is estimated to be negative. Although theoretically unjustifiable, such results are not uncommon where the problem of multicollinearity is serious. Spurr and Bonini state:¹

Collinearity may produce some peculiar results besides its effect upon the sampling error of the net regression coefficients. For example, two variables X_1 and X_2 may be highly positively related with Y and with each other. But the net effect of X_2 , taking X_1 into account, may be negative. For example, on a certain railroad, the number of miles travelled by empty cars may be positively correlated with the full-car mileage. So when the latter variable is included in the regression equation, the net effect of hauling empty cars may be negative.

The importance of money supply in explaining the behavior of stock prices has been discussed in chapter 2. Sprinkle found that the stock prices lag the monetary changes on the average by about 15 months prior to a bear market and two months prior to a bull market.² The lags

¹See William A. Spurr and Charles P. Bonini, Statistical Analysis for Business Decisions, (Homewood, Illinois: Richard D. Irwin, Inc., 1967), p. 611.

²See Barlyl W. Sprinkle, Money and Stock Prices, (Homewood, Illinois: R.D. Irwin, Inc., 1964), pp. 126-133.

among money supply changes, business activity and the general price level changes have been discussed by Friedman also.³ However, in this study the type I equations provide results superior (in terms of the size of the standard errors of estimates and the coefficients of determination) to those obtained from the type II equations. This could be due to several reasons. First, it is possible that a lag period of twelve months on the average may not be the right amount for the period used for this study. Second, the figures used for the stock prices and the supply of money in the study are the averages for the whole year; they are not figures for any particular point in time from which the lag was estimated. Finally, the changes in the stock prices are allowed to lag the changes in money supply only. The lags between the changes in stock prices and changes in the other independent variables have not been considered.

As type I equations furnish better results, the subsequent discussions in this chapter will be made on the basis of type I equations only.

³Milton Friedman, "The Supply of Money and the Price Level," in Deane Carson, Money and Finance (New York: John Wiley & Sons, Inc., 1966), pp. 152-153.

The results of the multiple regression show money supply as the most important causal factor in explaining the movement of stock prices in Canada. In the case of the U.S., though money supply is highly significant in explaining the movement of stock prices in the simple regression, it is insignificant in the multiple regression. Instead, the public spending becomes the dominant causal factor. Such a conclusion is not warranted, however, under a situation where the problem of multicollinearity between these two variables is severe. This study, therefore, remains inconclusive in establishing the influence of these two variables on stock prices.

Although the problem of multicollinearity makes it difficult to partition the relative influence of the individual variables correctly, their total influence is reflected by a high value of R^2 . The value of R^2 is 0.9330 for Canada. This means that in the case of Canada, 93.30 percent of variations in stock prices can be explained together by the money supply and the public spending. The corresponding value for the U.S. is 0.9444. This overall significance of the regression equations is also reflected in high F-values (Tables 1 to 4 in Appendix C).

As indicated before, several studies have been conducted to determine the relative influence of monetary and fiscal policy on economic activity. It may be appropriate to mention again that GNP is only an intermediate variable between the stock prices and fiscal and monetary policies. With GNP variable in this position, the problem of the relative influence of fiscal and monetary policy on GNP is equally applicable to stock prices.

In their study to determine the relative influence of monetary and fiscal actions on economic activity in the U.S., Anderson and Jordan found that only the supply of money significantly influenced economic activity.⁴ The same conclusion was arrived at by Keran when he made a study similar to that of Anderson and Jordan for some of the other countries.⁵

⁴See Leonall C. Anderson and Jerry L. Jordan, "Monetary and Fiscal Actions: A Test of Their Relative Importance in Economic Stabilization," Review - Federal Reserve Bank of St. Louis, November 1968, pp. 11-24.

⁵Michael W. Keran, "Monetary and Fiscal Influences on Economic Activity: The Foreign Experience," Review - Federal Reserve Bank of St. Louis, February 1970, pp. 16-28. In this study, the measures for the monetary influence used for each country was the money stock as defined by International Monetary Fund. Similarly, the only measure of fiscal influences used in this paper was total government spending culled from Treasury Statistics on cash outlays including transfers to government corporations.

Although some other studies conducted to determine the relative influence of money supply and public spending on economic activity have concluded that one or the other factor was more important, no such conclusion is warranted in the present study, due to the problem of multicollinearity. Another reason for inconclusive results in this regard is the complexity of the phenomenon of demand and supply in stocks. It is not always true that all factors related to demand and supply are also related to money supply and the public spending. In particular, such influences as the greater percentage of pension fund investment in common stocks is likely to be a strong positive factor on the demand and would support an increase in the value of common stock. Similarly, the increased internal financing of firms has resulted in a decrease in the quantity of the new issues of common stock coming to the market. The amount of internal funds has been augmented by a liberalized depreciation policy. This reflects a shift in the nature of fiscal policy of the federal government. As institutional investment in common stock has increased the demand of stock, fiscal policy has diminished the supply of common stock.

Interest Rate

It is generally accepted that the central bank can use interest rate as a tool to control money supply. In order to lower interest rates, it pumps money into the economy through open market operations. This results in high investments and increased economic activity. The reverse action is taken to slow down the economy.

In the simple regression equations for both Canada and the U.S., the interest rate variable has positive coefficients which are significant at the 1 percent level. For the U.S., it has a significant positive coefficient even in the multiple regression. The introduction of this variable in the regression equation of the three independent variables, i.e. money supply, public spending and interest rate, increases the value of R^2 to 0.9508 for Canada and 0.9664 for the U.S. It also reduces the size of the standard error of estimate to 7.62 for Canada and 6.81 for the U.S. (Appendix C, Tables 1 and 3).

Although due to a high correlation among interest rate, money supply, and public spending, the coefficient of the

interest rate in the regression is unreliable, the direction of change predicted by the coefficient of this variable is unjustifiable according to the traditional investment theory. However, this can be explained.

The inverse relationship between interest rate and investment may be true only when other relevant exogeneous variables in the economy are constant. During the period considered in this study, there had been rapid changes in both the monetary sphere and the goods sphere.

Investment decisions are made on the basis of a stream of expected income. During the period under consideration the economy had been generally expanding. New technology and products had prevented marginal efficiency of capital from falling. The profitability of investments had maintained an upward pressure on the demand of funds and interest rates. The difference between the marginal efficiency of capital and the interest rate had been significant enough to warrant further investments in spite of increasing rates of interest.

Another possible explanation for increased investments in the face of high rates of interest can be found in the

timing of interest rates with rising prices. Interest rates are slow to adjust with price rises, and so the productive enterprises find the cost of borrowing to be relatively low.

The above explanation for the positive coefficient of the interest rate has been furnished within a framework of traditional theory of investment. However, according to Friedman, interest rates are not dependent on the supply of money in the long run. There is no apparent relation between expenditures (which is considered closely related to the demand of funds) and interest rates.⁶ He argues that if the Federal Reserve Board tries to lower interest rates by buying government bonds, and increase the total supply of money from the public, it will be successful only in the short run. In the long run the action will increase interest rates. Expanded money supply will provide the public the means to do more purchasing and loaning. This will step up business activity, which will be reflected in demand for goods and capital

⁶The subsequent discussion is based on the presidential address delivered by Milton Friedman at the Eightieth Annual Meeting of the American Economic Association, Washington, D.C., December 29, 1967. For details see The American Economic Review, Vol. 58, No. I, March, 1968, pp. 5-7.

expenditure. Therefore, the interest rate will tend to go up after a lag of around nine months.

It can be seen from the tables 3 and 4 in Appendix A, that the indexes for the money supply and interest rate variable have been increasing simultaneously, and have a high degree of correlation. This may suggest the validity of Friedman's theory of interest rate. In any case, it may be reasonable to conclude that interest rates do not have any significant influence on stock prices.

Tax Rate

This study does not show any significant correlation between tax rate and any of the other independent variables (Tables 1 to 4, Appendix B). In the case of simple regression, the coefficients for the tax rate for both Canada and the U.S. are positive but insignificant. However, when this variable is included in the regression equations with other independent variables, its coefficients become negative. It also increases the value of R^2 to 0.9532 for Canada and 0.9686 for the U.S. However, this increase in the value of R^2 is accompanied by a corresponding increase in the size of standard errors of estimate (Tables 1, 2, 3 and 4).

The negative coefficients of the tax rate variable, although insignificant in both the cases of Canada and the U.S., is theoretically justifiable within the framework of the Keynesian macroeconomic theory. The Keynesian economists think that a decrease in the tax rate is associated with an increase in private spending and in economic activity in general. This, in turn, may be reflected in the upward movement of the stock prices. The tax cut introduced during the Kennedy administration and carried out in 1964 is a classic example of its influence on the economic activity and stock prices.

However, the effect of the tax rate variable does not seem to be reflected properly in the present study for two main reasons. First, tax rates in the Canadian and the U.S. economy have been almost constant in the period chosen for this study. There are not enough variations in the tax rates, in both Canada and the U.S. Secondly, the changes in tax rates can be easily offset by changes in public spending and monetary policy. An increase in taxes, for example, would reduce private spending. But if the government spends the new revenue, it offsets the reduction in private spending.

However, if the government does not spend the extra tax revenue and piles up a budget surplus it will have an anti-inflationary effect.

Summary

The two types of equations used in this study for both Canada and the U.S. provided similar results. However, in the case of type I equations, the size of standard errors of estimate was smaller, and the values of R^2 higher. Hence the conclusions were mainly based on the type I equations.

The problem of multicollinearity was severe in this study. Hence the individual regression coefficients were not reliable. But the values of R^2 in the multiple regression equation with all four variables was high for both countries. This meant that a large percentage of the variations in stock prices could be explained by these variables. Further, the values of the standard errors of estimate ranged within 15 index points. Therefore, although the individual regression coefficients were not reliable, the overall regression estimates were significant.

This was also reflected in the high F-values.

However, the values of r^2 for the money supply with stock prices and the public spending with stock prices were also high, suggesting a high degree of importance of these two variables alone in explaining the movement of stock prices. But since the collinearity between these two variables was very high, the study remained inconclusive regarding the relative importance of these two variables.

Further, in view of the regression estimates and of the theoretical discussions, it was concluded that the interest rates and the tax rates in the long run did not significantly influence stock prices.

The results obtained in this study for both Canada and the U.S. were very similar.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

The study was undertaken to examine the influence of fiscal and monetary policies on stock prices on a long term basis. Total supply of money and interest rate were used as the principal monetary measures, while total public spending and tax rate were used as the principal fiscal measures.

Multiple regression was used to measure the influence of fiscal and monetary policies on stock prices. Four regression equations were developed. The first two estimated the influence of these policies on stock prices in Canada for the time period 1950-1966. The other two

equations estimated their influence in the U.S. for the same time period.

Conclusions

The results of the study show that money supply and public spending combined together had a very significant influence on stock prices. However, due to the problem of high collinearity between these two factors, it was not possible to partition their influence on stock price correctly. The overall regression estimates were highly significant as suggested by the F-values, the values of R^2 , and the size of the standard errors of estimate.

Interest rate showed a positive correlation with stock prices. This direction of change, although not justifiable within the framework of macroeconomic theory, was explained by significant structural changes in the economy and by Friedman's analysis of the role of interest rate and money supply. The results show that interest rates in the long run did not have significant influence on stock prices.

The influence of tax rate was not properly reflected in the results of the present study. Although Keynesian

macroeconomic theory suggests an inverse relationship between the tax rate and GNP (and hence stock prices), this relationship was not established in the present study mainly for two reasons. First, there had not been enough variations in the tax rates. Second, the effect of tax rate changes could easily be offset by other important changes in the economy, such as a significant change in public spending or the total supply of money.

The presence of multicollinearity was the main hindrance in partitioning correctly the total influence of money supply and public spending on stock prices. Yet the equations can be used for the intermediate term predictions, i.e., for periods ranging from two to five years. Predictions for the short term depend largely on the immediate determinant of stock prices. For any period longer than five years, significant structural changes could occur in an economy. However, these limitations are not ordinarily true for intermediate term predictions.

SELECTED BIBLIOGRAPHY

- Anderson, Leonall C. and Jordan, Jerry L. Monetary and Fiscal Actions: "A Test of Their Relative Importance in Economic Stabilization." Review, Federal Reserve Bank of St. Louis, (November 1969).
- Bratt, E. Business Cycles and Forecasting. 5th ed. Illinois: Richard D. Irwin, Inc., 1961.
- Cooke, Gilbert W. The Stock Markets. New York: Simmons-Boardman Publishing Corporations, 1964.
- Durbin, J. and Watson, G.S. "Testing for Serial Correlation in Least Square Regression." Biometrika, vol. 38 (1951).
- Friedman, Milton. The Supply of Money and Price Level. Money and Finance. ed. Deane Carson. New York: John Wiley and Sons, Inc., 1966.
- Helmer, Bordon. "Economic Perspective for Planning." Financial Analysts Journal, (July-August 1964).
- Johnston, J. Econometric Methods. New York: McGraw-Hill Book Co., 1963.
- Keran, Michael W. "Monetary and Fiscal Influences on Economic Activity: The Foreign Experience." Review, Federal Reserve Bank of St. Louis, (February 1970).
- Keran, Michael W. "Monetary and Fiscal Influences on Economic Activity: The Historical Evidence." Review, Federal Reserve Bank of St. Louis, (November 1969).
- Krishna, Virendra. Factors Influencing Stock Prices in Canada in the Long Run. Unpublished M.B.A. Thesis; University of Alberta, Fall 1969.

- Poole, Alan C. "Relationship of Money Market and the Economy." The Commercial and Financial Chronicle, (September 8, 1966).
- Ritter, Lawrence S. "The Role of Money in Keynesian Theory." The Essays in Banking and Monetary Studies. ed. Deane Carson. Homewood: Richard D. Irwin, Inc. 1963.
- Salz, Frank. "Is the Investor Facing Bleak Years Ahead?" Financial Analyst Journal, (September-October and November-December 1964).
- Solomon, Ezra. "Economic Growth and Common Stock Values." Journal of Business (July 1955).
- Sprinkle, Beryl W. Money and Stock Prices. Homewood: Illinois: R.D. Irwin, Inc., 1964.
- Spurr, William A. and Bonini, Charles P. Statistical Analysis for Business Decisions. Homewood, Illinois: Richard D. Irwin, Inc., 1967.
- Weston, J. Fred. "The Stock Market in Perspective." Harvard Business Review. (March-April 1956)
- Weston, J. Fred. and Eitman, David K. "Economic Trends and Security Values - A Bleak or Bountiful Future for Investors?" Financial Analysts Journal, (January-February 1965).

APPENDIX A

INDEXES OF THE VARIABLES INCLUDED
IN THE REGRESSION MODEL

TABLE A-1

STOCK PRICE INDEXES, MONEY SUPPLY, PUBLIC
SPENDING, INTEREST RATE AND TAX RATE FOR
THE TIME PERIOD 1949-1967 FOR CANADA

Year*	Stock Price Indexes ¹	Money ² Supply 1000 Millions Dollars	Public ¹ Spending Million Dollars	Interest Rates Percent	Tax ³ Rates Percent
1949	64	4.42	2098	1.50	18.6
1950	80	4.33	2366	2.00	16.7
1951	107	4.37	2810	2.00	16.3
1952	110	4.65	3634	2.00	20.1
1953	100	4.55	4231	2.00	20.7
1954	114	4.92	4239	2.00	21.0
1955	150	5.25	4151	2.75	19.9
1956	177	5.18	4305	3.92	20.0
1957	105	5.39	4709	3.87	19.3
1958	100	6.08	4934	3.75	18.5
1959	117	5.89	5206	5.37	17.5
1960	112	6.19	5537	3.50	19.3
1961	144	6.96	7129	3.24	20.0
1962	137	7.19	7424	4.00	18.2
1963	100	7.71	7507	4.00	18.4
1964	122	8.42	7891	4.25	20.0
1965	104	9.62	8434	4.75	20.0
1966	128	10.33	9645	5.25	19.5
1967	136	11.92	10887	6.00	19.7

Source: 1. United Nations Statistical Yearbook, various issues from 1948 through 1968.
2. International Financial Statistics, various issues from 1949 through 1968.
3. Computed from figures, obtained from U.N. Statistical Yearbook, on national income and total taxes.

*For the years 1949 to 1956, the base year is 1953. The base year for the period 1957-1962 is 1958, and for the period 1963-1967, it is 1963.

STOCK PRICE INDEXES, MONEY SUPPLY, PUBLIC SPENDING,
INTEREST RATE AND TAX RATE FOR THE TIME PERIOD
1949-1967 FOR THE UNITED STATES

Year*	Stock Price Indexes ¹	Money ² Supply 1000 Million Dollars	Public ¹ Spending 1000 Million Dollars	Interest ² Rate Percent	Tax ³ Rates Percent
1949	87	111.2	--	--	--
1950	88	117.7	59.37	1.75	24.9
1951	102	124.5	62.45	1.75	29.3
1952	89	129.0	99.14	1.75	30.0
1953	100	131.1	109.47	2.00	30.0
1954	131	134.1	105.72	1.50	27.4
1955	155	137.1	107.42	2.50	21.2
1956	139	138.6	112.55	3.00	28.6
1957	100	137.6	120.30	3.00	28.4
1958	101	143.3	141.04	2.50	27.1
1959	137	143.6	157.81	4.00	30.1
1960	167	142.8	160.14	3.00	30.1
1961	171	147.7	172.00	3.00	30.0
1962	161	150.7	183.72	3.00	30.4
1963	100	156.9	196.13	3.50	28.8
1964	108	164.6	208.37	4.00	30.7
1965	105	173.1	213.43	4.50	21.0
1966	101	178.6	240.34	4.50	30.1
1967	108	191.9	277.55	4.50	--

Source: 1. United Nations Statistical Yearbook, various issues from 1948 through 1968.
2. International Financial Statistics, various issues from 1949 through 1968.
3. Computed from figures, obtained from U.N. Statistical Yearbook, on national income and total taxes.

*For the years 1949 to 1956, the base year is 1953. The base year for the period 1957-1962 is 1958, and for the period 1963-1967, it is 1963.

TABLE A-3

INDEXES OF STOCK PRICES, MONEY SUPPLY,
PUBLIC SPENDING, INTEREST RATES AND TAX RATE FOR
THE TIME PERIOD 1949-1967 FOR CANADA

Year	Stock Price	Money Supply	Public Spending	Interest Rate	Tax Rate
1949		57			
1950	34	56	32	50	89
1951	45	57	38	50	110
1952	46	60	49	50	113
1953	42	59	56	50	114
1954	48	64	56	50	108
1955	63	68	55	69	109
1956	75	67	57	98	105
1957	71	70	62	98	100
1958	68	79	65	94	95
1959	78	76	69	134	105
1960	76	80	73	87	109
1961	97	90	95	81	99
1962	92	93	99	100	100
1963	100	100	100	100	109
1964	122	109	105	106	109
1965	135	124	112	119	106
1966	128	134	129	131	127
1967	138	154	144	150	

Source: Table A-1

TABLE A-4

INDEXES OF STOCK PRICES, MONEY SUPPLY, PUBLIC
SPENDING, INTEREST RATE AND TAX RATE FOR THE
TIME PERIOD 1949-1967 FOR THE U.S.A.

Year	Stock Price	Money Supply	Public Spending	Interest Rate	Tax Rate
1949					
1950	25	75	30	50	82
1951	31	79	32	50	98
1952	33	82	50	50	99
1953	33	83	56	57	99
1954	41	85	54	43	90
1955	57	88	55	71	70
1956	67	88	57	85	94
1957	64	88	61	85	94
1958	73	91	72	71	89
1959	84	91	80	114	99
1960	79	91	82	85	99
1961	95	94	88	85	99
1962	89	96	93	85	100
1963	100	100	100	100	95
1964	118	105	106	114	101
1965	128	110	109	128	69
1966	124	114	122	128	99
1967	133	122	141	128	

Source: Table A-2

APPENDIX B

SIMPLE CORRELATION COEFFICIENTS

TABLE B-1

SIMPLE CORRELATION COEFFICIENTS BETWEEN
INDEPENDENT VARIABLES IN CASE OF THE
TYPE I EQUATIONS FOR CANADA

Variables	Money Supply	Public Spending	Interest Rate	Tax Rate
Money Supply	1	0.97	0.76	0.36
Public Spending	0.97	1	0.74	0.37
Interest Rate	0.76	0.74	1	0.15
Tax Rate	0.36	0.37	0.15	1

TABLE B-2

SIMPLE CORRELATION COEFFICIENTS BETWEEN
INDEPENDENT VARIABLES IN CASE OF THE
TYPE II EQUATIONS FOR CANADA

Variables	Money Supply	Public Spending	Interest Rate	Tax Rate
Money Supply	1	.96	.81	.39
Public Spending	.96	1	.74	.37
Interest Rate	.81	.74	1	.15
Tax Rate	.39	.37	.15	1

TABLE B-3

SIMPLE CORRELATION COEFFICIENTS BETWEEN
INDEPENDENT VARIABLES IN CASE OF THE TYPE I
EQUATIONS FOR THE U.S.A.

Variables	Money Supply	Public Spending	Interest Rate	Tax Rate
Money Supply	1	.96	.89	-.02
Public Spending	.96	1	.88	.13
Interest Rate	.89	.88	1	-.003
Tax Rate	-.02	0.13	-.003	1

TABLE B-4

SIMPLE CORRELATION COEFFICIENTS BETWEEN
INDEPENDENT VARIABLES IN CASE OF THE TYPE II
EQUATIONS FOR THE U.S.A.

Variables	Money Supply	Public Spending	Interest Rate	Tax Rate
Money Supply	1	.96	.91	.03
Public Spending	.96	1	.88	.13
Interest Rate	.91	.88	1	-.003
Tax Rate	.03	.126	-.003	1

APPENDIX C

ESTIMATES OF THE OTHER
REGRESSION EQUATIONS

TABLE C-1

ESTIMATE OF PARAMETERS OF THE TYPE I MULTIPLE
 REGRESSION EQUATION FOR CANADA, WITH
 MONEY SUPPLY AND PUBLIC SPENDING,
 AND WITH MONEY SUPPLY, PUBLIC
 SPENDING AND INTEREST RATE

Variables	Money Supply (X_1)	Public Spending (X_2)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)
Intercept	-18.67		-21.56		
Coefficient	.875	.338	.710	.304	.218
T-Value	2.42	1.10	2.14	1.10	2.13
F-Value	98.47		83.76		
Standard Error of Estimate	8.53		7.62		
R^2	.9330		.9508		

TABLE C-2

ESTIMATES OF PARAMETERS OF THE TYPE II
 MULTIPLE REGRESSION EQUATION FOR CANADA
 WITH MONEY SUPPLY AND PUBLIC SPENDING, AND
 WITH MONEY SUPPLY, PUBLIC SPENDING AND INTEREST RATE

Variables	Money Supply (X_1)	Public Spending (X_2)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)
Intercept	-21.39		-17.96		
Coefficient	.81	.49	.45	.58	.20
T-Value	1.95	1.63	.98	2.00	1.59
F-Value	87.5		65.65		
Standard Error of Estimate	9.01		8.55		
R^2	.9250		.9380		

TABLE C-3

ESTIMATES OF PARAMETERS OF THE TYPE I MULTIPLE
 REGRESSION EQUATION FOR THE U.S.A., WITH
 MONEY SUPPLY AND PUBLIC SPENDING, AND WITH
 MONEY SUPPLY, PUBLIC SPENDING AND INTEREST RATE

Variables	Money Supply (X_1)	Public Spending (X_2)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)
Intercept	-113.70		-74.45		
Coefficient	1.55	.60	.83	.50	.41
T-Value	2.02	2.01	1.24	2.06	2.92
F-Value	118.70		124.61		
Standard Error of Estimate	8.44		6.81		
R^2	.9444		.9664		

TABLE C-4

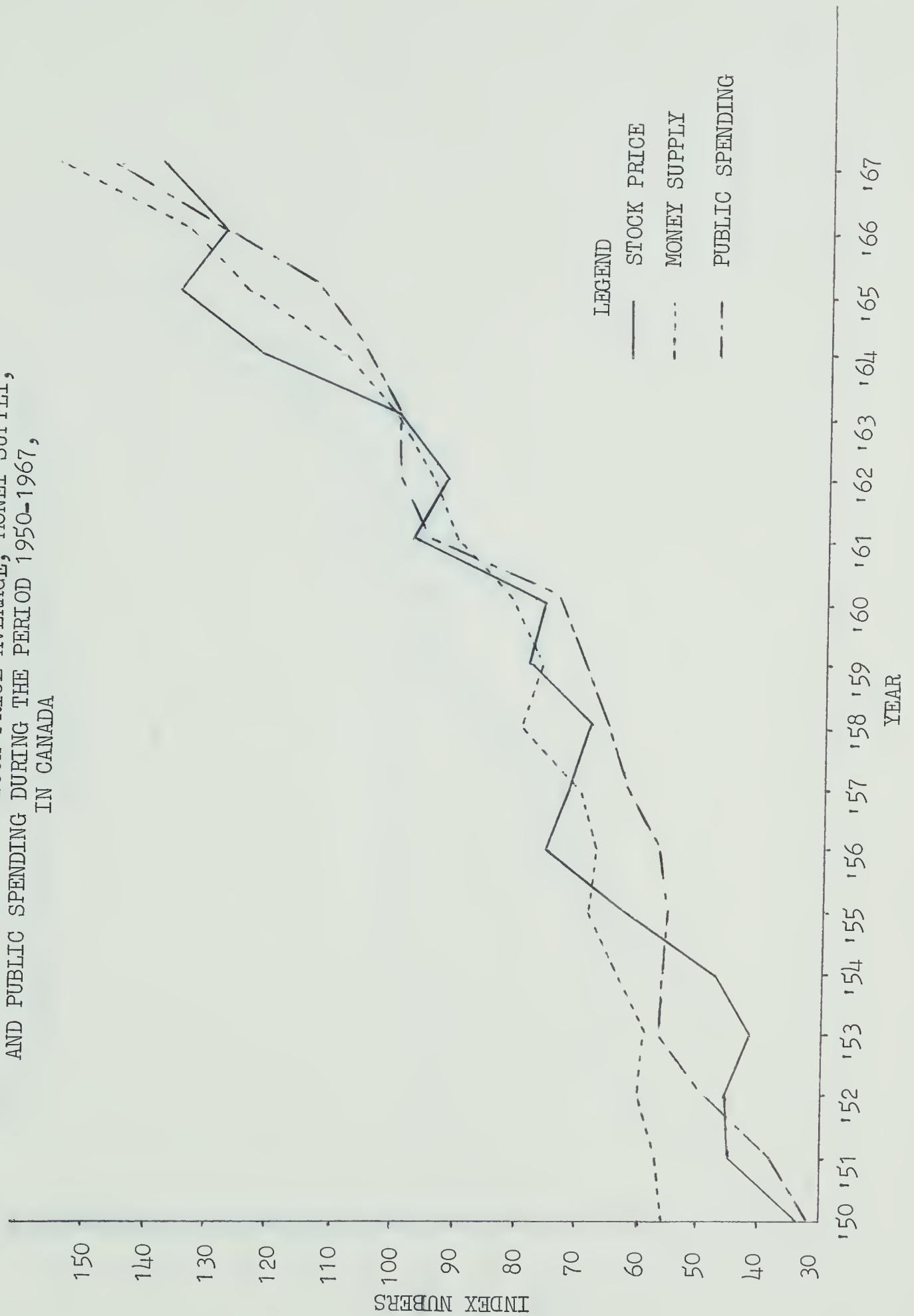
ESTIMATES OF THE PARAMETERS OF THE TYPE II
 MULTIPLE REGRESSION EQUATION FOR THE U.S.A.,
 WITH MONEY SUPPLY AND PUBLIC SPENDING, AND
 WITH MONEY SUPPLY, PUBLIC SPENDING AND
 INTEREST RATE

Variables	Money Supply (X_1)	Public Spending (X_2)	Money Supply (X_1)	Public Spending (X_2)	Interest Rate (X_3)
Intercept	-110.36		-40.37		
Coefficient	1.53	.64	.29	.68	.45
T-Value	1.74	1.96	.35	2.52	2.75
F-Value	111.64		111.94		
Standard Error of Estimate	8.69		7.17		
R^2	.9410		.9627		

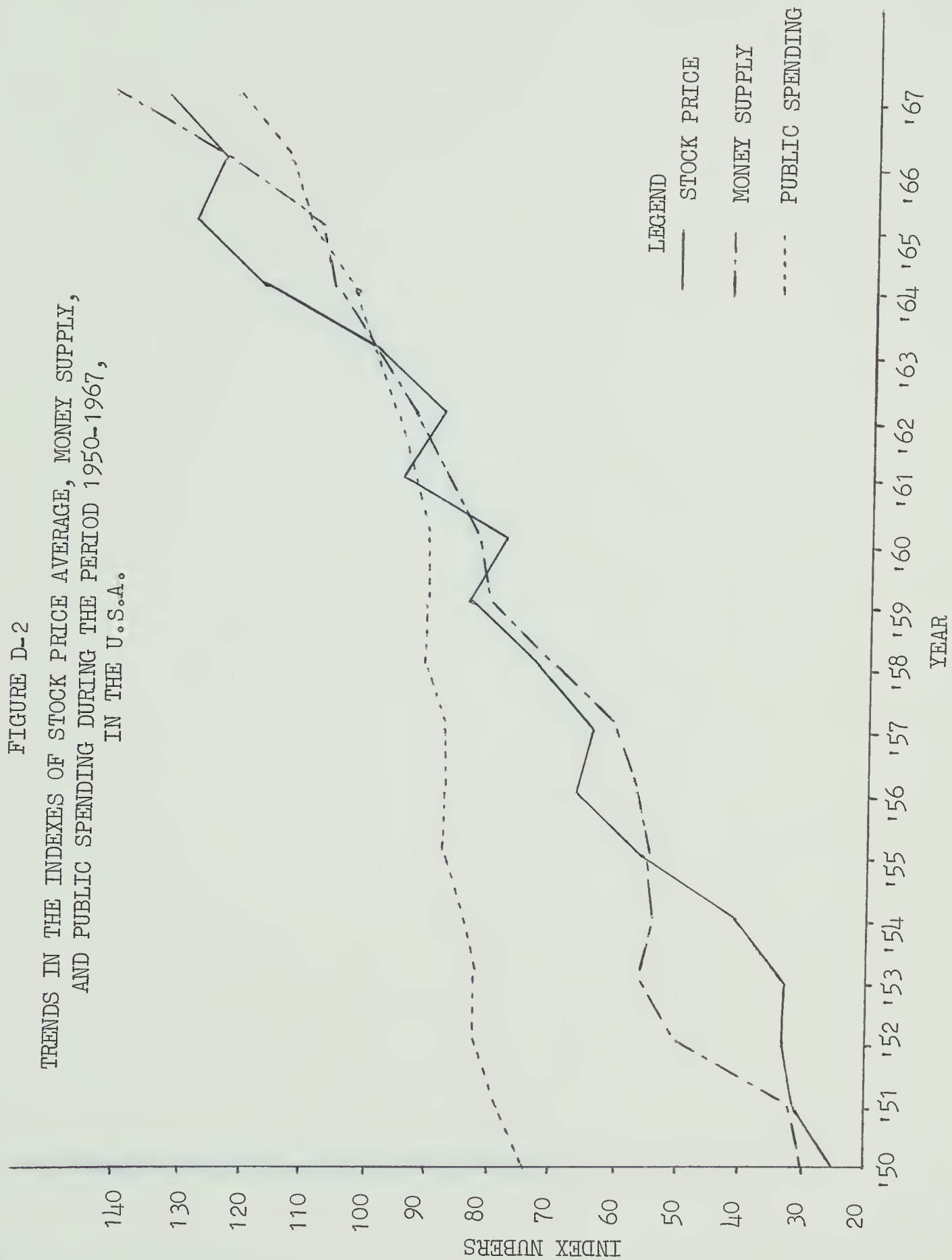
APPENDIX D

ADDITIONAL GRAPHS

FIGURE D-1
TRENDS IN THE INDEXES OF STOCK PRICE AVERAGE, MONEY SUPPLY,
AND PUBLIC SPENDING DURING THE PERIOD 1950-1967,
IN CANADA









B29950